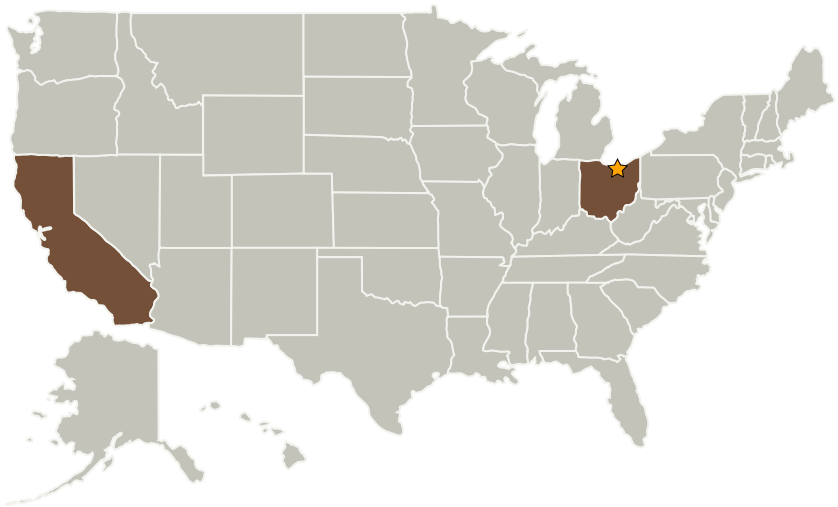
Automated Analysis of Imaging Based Experiments, Phase II

Completed Technology Project (2009 - 2012)

Project Introduction

For many applications involving liquid injection, the ability to predict the details of the breakup process is often limited due to the complexity of the two-phase phenomena. Likewise, the ability to experimentally characterize these phenomena is also limited due in part to the need to rely upon visualization tools which are inherently qualitative. As a result, the ability to validate predictions using these diagnostic tools is also limited. In recent years, visualization diagnostics have evolved substantially in terms of spatial and temporal resolution. The advancements, coupled with a tool to conveniently quantify the results obtained relative to the breakup process offer the potential for a marked increase in understanding of this phenomenon. The proposed effort will develop such a tool that will be applied to the problems of pressure swirl injectors and liquid injection into a crossflow. The typical characteristics associated with this type of liquid breakup, such as column/sheet flattening, bending, fracture point, dynamics, etc. will be automatically quantified using the tool proposed. The project will utilize existing results obtained with state-of-the-art high speed imaging, but will acquire limited data as well to validate the tools developed. Comparisons with advanced CFD modeling will be made to demonstrate the application of the software developed.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Energy Plus Ltd.	Supporting Organization	Industry	Laguna Hills, California

Primary U.S. Work Locations	
California	Ohio

Project Transitions

February 2009: Project Start

January 2012: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.5 Mission Architecture, Systems Analysis and Concept Development
    - TX11.5.2 Tools and Methodologies for Performing Systems Analysis